UCRL-AR-126783-06

Environmental Protection Department
Operations and Regulatory Affairs Division

Lawrence Livermore National Laboratory
Livermore Site

Annual Storm Water Monitoring Report for Waste Discharge Requirements 95-174

Annual Report
2005 - 2006

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This work was performed under the auspices of the U.S. Department of Energy by the University of California, Lawrence Livermore National Laboratory under contract No. W-7405-Eng-48.

Lawrence Livermore National Laboratory Livermore Site Annual Storm Water Monitoring Report for WDR 95-174

Reporting Period May 1, 2005 through April 30, 2006

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Acronyms and Definitions

Ag	agricultural use
ALPE	Arroyo Las Positas East (storm water influent sampling location)
ALPO	Arroyo Las Positas Outfall (storm water influent sampling location)
ASS2	Arroyo Seco South (storm water influent sampling location)
ASSE	Arroyo Seco Southeast (storm water influent sampling location in East Avenue drainage ditch)
ASW	Arroyo Seco West (storm water effluent sampling location)
AWQC	ambient water quality criteria
B	Building
BMP	best management practice
Bq/L	becquerel/liter
CA	California
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act of 1980
DI	deionized water
DOE	Department of Energy
DRB	Drainage Retention Basin
EPD	Environmental Protection Department
ERD	Environmental Restoration Division
FY	fiscal year (October through September)
GRNE	Greenville Road East (storm water influent sampling location)
RHWM	Radiological Hazardous Waste Management
IH	Industrial hygienist
LCW	Low conductivity water
LLNL	Lawrence Livermore National Laboratory
LOEC	lowest observed effects concentration
MCL	maximum contaminant level
mg/L	milligrams per liter
M&O	Maintenance and Operation
MSDS	Material Safety Data Sheet
na	not analyzed
NIF	National Ignition Facility
NOEC	no observed effects concentration
NPDES	National Pollutant Discharge Elimination System
O & G	oil and grease
pCi	picocurie
PMCL	primary maximum contaminant level
QA/QC	quality assurance/quality control
RQ	reportable quantity
SC	specific conductance
SFBRWQCB	San Francisco Bay Regional Water Quality Control Board
SI	système internationale
SM	standard method
SWAR	Storm Water Annual Report
SWPPP	Storm Water Pollution Prevention Plan
T	trailer
TDS	total dissolved solids
TOC	Total organic carbon
TSS	total suspended solids
U.S. EPA	United States Environmental Protection Agency
WDR	Waste Discharge Requirements
WGMG	Water Guidance and Monitoring Group
WPDC	West Perimeter Drainage Channel (storm water effluent sampling location)

EXECUTIVE SUMMARY

Results of the storm water quality monitoring program at Lawrence Livermore National Laboratory (LLNL) in Livermore, California are reported as required in the Waste Discharge Requirements (WDR) 95-174, National Pollutant Discharge Elimination System (NPDES) Permit No. CA0030023. This report presents results for the 2005-2006 water year including: the Storm Water Pollution Prevention Plan (SWPPP) facility inspection results, wet and dry season observations, storm water discharge analytical data, and a summary interpretation of the data.

The facility inspection results indicated a few minor instances at the Livermore site in which best management practices (BMPs) listed in the SWPPP were not properly implemented, but that corrective actions have either been made or are in progress. Other than minor issues at upstream sampling locations, storm water observations did not identify any issues. Although there are no numeric effluent limits placed on storm water discharges, data are compared with various criteria to determine if water quality remains similar to natural or upstream conditions. Acute and chronic fish toxicity testing indicated no toxicity in effluent storm water samples. Some chemical constituents, mostly inorganics and pesticides, were above LLNL site-specific comparison criteria at site effluent sampling locations. Most of these values are attributed to off-site activities upstream of the Laboratory. All tritium results were less than comparison criteria and the drinking water MCL. These monitoring results suggest that operations at the LLNL Livermore site during 2005 -2006 did not impact storm water quality.

1.0 Introduction

Storm water monitoring quality results for the LLNL Livermore site are summarized, fulfilling the annual reporting requirements of WDR 95-174, issued by the San Francisco Bay Regional Water Quality Control Board (SFBRWQCB) on August 23, 1995, (hereafter referred to as "the Permit"). The Permit expired on August 23, 2000. LLNL submitted a Report of Waste Discharge (and an NPDES permit application) to renew the Permit on February 18, 2000, meeting the requirement to submit a renewal application 180 days in advance of permit expiration. SFBRWQCB staff confirmed the administrative continuance in November 2000 (Morse 2000).

LLNL consists of two sites: the Livermore site located east of the City of Livermore and the Experimental Test Site (Site 300) located in the Altamont Hills southwest of Tracy. This report discusses the results of the 2005-2006 Livermore site storm water monitoring program.

The Livermore site is a 3.28-km^2 facility that is crossed by two intermittent streams, Arroyo Las Positas and Arroyo Seco. The average annual rainfall at the Livermore site is 35.6 cm; this wet season's rainfall was 45.4 cm. Monthly rainfall totals are presented in **Table 1**. LLNL monitors influent and effluent water quality as required by the permit. The six perimeter storm water sampling locations are shown in **Figure 1**, along with three internal monitoring locations around the drainage retention basin on site.

Table 1. Monthly rainfall totals (in cm) collected at the LLNL site meteorological station

Date	**Monthly Total** (cm)
May 2005	2.2
June 2005	0.1
July 2005	0.0
August 2005	0.0
September 2005	1.0
October 2005	0.4
November 2005	1.8
December 2005	12.2
January 2006	6.4
February 2006	3.0
March 2006	11.0
April 2006	7.4
Water Year TOTAL	**45.4**

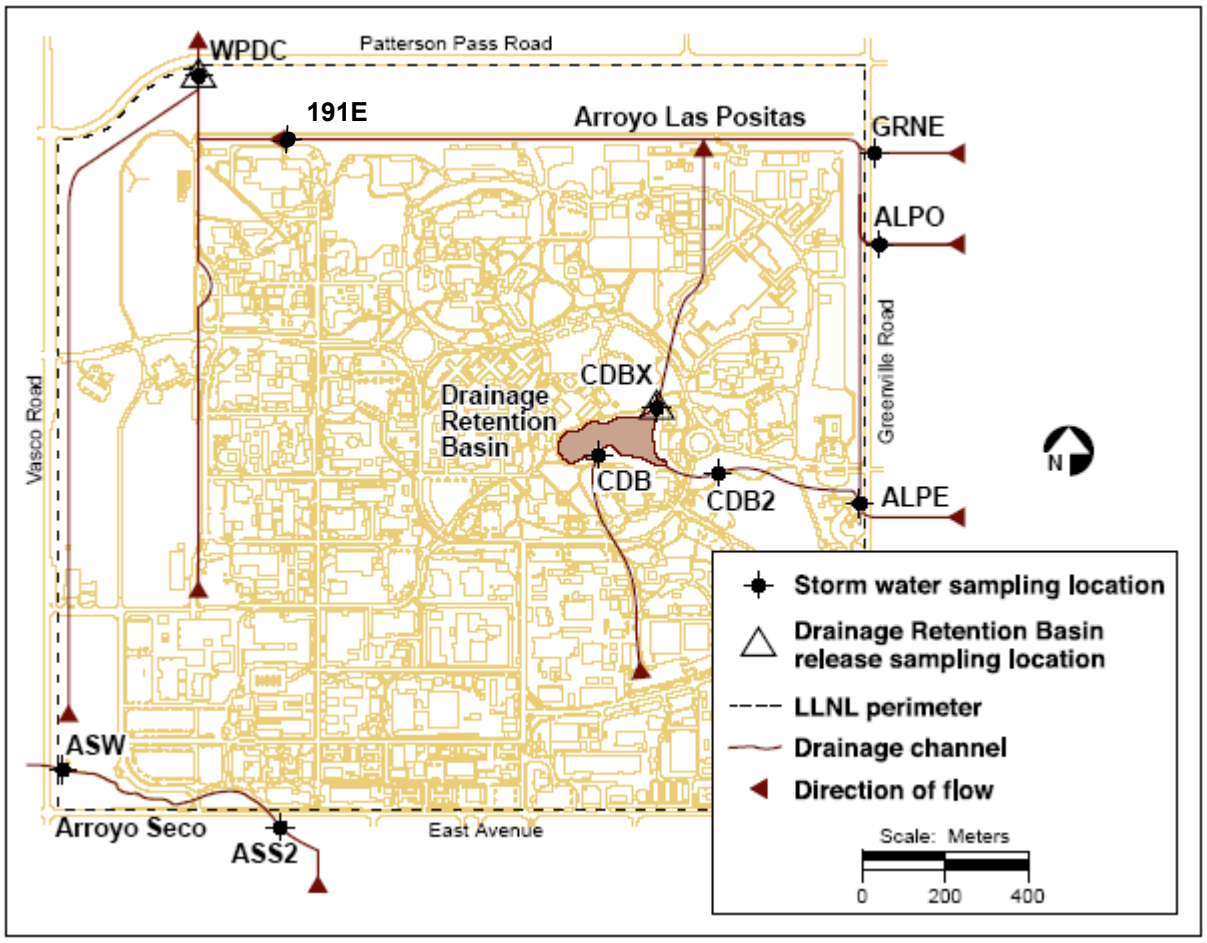

Figure 1. Routine storm water sampling and observation locations

2.0 Nonstorm Water Discharges

The SFBRWQCB issued the Permit to LLNL, allowing storm water discharges associated with industrial activities and four categories of nonstorm water discharges, including mechanical equipment sources (e.g., air conditioners), building and grounds maintenance (e.g., landscape irrigation), fire suppression and safety systems (e.g., hydrant testing), and water systems (e.g., backflow preventors). In addition, the Permit allows LLNL to administratively control several building conduits that remain open because they are impractical to seal.

LLNL tracks authorized nonstorm water discharge sources through the Building Drain Management database and key plans, and an internal drain connection permitting process. As required by the Permit, Provision C.8, LLNL evaluates all new construction, remodeling, and equipment upgrades to determine if it is practical to eliminate permitted discharge sources. If it is practical to do so, the discharge is eliminated. Modifications that result in new connections to building conduits are added to the Building Drain Management database.

Authorized nonstorm water discharge sources and open building conduits are included in LLNL's Dry Season Observation Program. These observations help LLNL

verify that the BMPs applied to these discharge sources continue to be properly implemented. Areas in the Dry Season Observation Program include secondary containment areas, loading and receiving areas, floor drains open to the storm drainage system, and automatic sump pumps. These locations and observation results are discussed in detail in this report in **Section 4.0**, Visual Observations.

Nonroutine releases are summarized in **Appendix A**, **Table A-1**. This table includes unplanned releases reportable under the Permit, Provision C.1, and nonroutine releases allowed under the Permit but requiring prior notification under Provision C.7. During this wet season, an accidental nonroutine release occurred on April 5, 2006 in which gasoline was released to the storm drain system at LLNL. Details of the release were reported to the SFBRWQCB in a letter to Mr. Devender Narala on April 7, 2006 (Lamarre 2006). An estimated 20 to 25 gallons of gasoline were released from a government vehicle to asphalt after a pop-up security barrier was activated while the vehicle was still over the barrier. Absorbent was applied to the area and an estimated 10 gallons of the gasoline were recovered, however, a sheen and odor were observed at the Arroyo Las Positas.

Samples were collected from two locations in the Arroyo Las Positas, one just downstream of the confluence of Avenue B and the arroyo (location 191E) and the other at the permanent Livermore site runoff effluent location (WPDC) (**Figure 1)**. The analytical results for these samples were compared to the most appropriate Water Quality objective, EPA Drinking Water Maximum Contaminant Levels (MCLs). The results for constituent concentrations measured above the Practical Quantitation Limit (PQL) are in **Table 2**. Neither sample analyzed returned a result greater than the PQL for TPH:g of 50 μg/L. None of the organics (Benzene, Toluene, Ethylbenzene or Xylene [BTEX]) detected were found at concentrations near or exceeding the EPA Drinking Water MCL. The concentrations of the BTEX organics detected in the samples were, however, higher than LLNL has typically found in storm water runoff samples during routine rainy season sampling events.

Table 2. Analytical results from samples collected in Arroyo Las Positas downstream from the confluence of the Avenue B storm drain

Constituent [a]	WPDC (site effluent)	191E (Avenue B confluence)	EPA MCL
Benzene (μg/L)	1.3	2.5	5.0
Ethylbenzene (μg/L)	3.8	8.1	700
Toluene (μg/L)	12	29	1000
Total Xylenes (μg/L)	23	45	10,000

[a] EPA 8260 was requested and the results presented are only those detected above the PQL.

These results indicate that the organic constituents related to the release of gasoline to Arroyo Las Positas could be detected in samples. However, it does appear that LLNL's efforts to recover the gasoline were successful in mitigating significant impacts from this accidental nonroutine release to the environment.

3.0 Annual Site Inspections

Each directorate at LLNL conducts an annual inspection of its facilities to verify implementation of the SWPPP and ensure that measures to reduce pollutant loading to

storm water runoff are adequately and properly implemented. The Associate Directors for each of the directorates certify that their facilities comply with the provisions of the Permit and the SWPPP. Each directorate documents and keeps on file the annual inspection results (as required by the Permit). These records include the dates, places, and times of the site inspections and the names of individuals performing the inspections. Because of the large number of facilities inspected (more than 500 buildings and trailers), the detailed inspection results are not included in this report, but the individual inspection records are available for submittal or review upon request. All inspections were completed; findings and deficiencies are summarized in **Appendix A, Table A-2**.

A few minor issues were identified in the annual SWPPP inspections. All of these issues have either been corrected or are in progress of being corrected as described in **Table A-2.** All other inspections indicated that the applicable BMPs were implemented correctly and adequately.

4.0 Visual Observations

Dry season observations were performed and are provided in **Appendix A**, **Table A-3**. The Permit requires that observations be conducted at least twice during the dry season (May through September). These observations occurred on June 28, and September 20, 2005, at storm water effluent sampling locations (Figure 1, ASW and WPDC), at storm water influent sampling locations (ASS2, ALPE, ALPO, and GRNE) (**Figure 1**), at areas with a "high potential" of storm water pollution, and at nonstorm water discharge locations, to determine the presence of stains, sludges, odors, and other anomalous conditions. "High potential" areas include areas with automatic (e.g., sump pumps) or direct connections to the surface and areas where activities may result in accidental releases to the surface (e.g., loading/receiving areas and open rinse areas).

To determine the "high potential" areas, LLNL compiled and categorized potential storm water pollution areas, using information from the following sources:

- *LLNL Livermore Site Annual Storm Water Monitoring Report* (Brandstetter 1994).
- LLNL's Building Drain Management Database.
- LLNL's *Report of Waste Discharges*, March 1995 (Mathews and Welsh 1995).
- LLNL's Observation Records.

LLNL then conducted inspections, visual observations, and assessments of these potential areas for storm water pollution. Areas determined as "high potential" are included in the dry season observation program as follows:

- Arroyo Seco and Arroyo Las Positas (observations conducted at influent and effluent locations).
- Avenue K storm drain.
- Automatic sump pump area at Building 191.
- Loading/receiving areas in Buildings 194 and 341.
- Concrete wash area near Parking Lot F-2.
- Floor drain areas open to the environment in Buildings 111, 194, 391, and 551.

During this reporting period, the dry season observations did not identify any unusual discharges. Observed evidence of flow at some locations was from discharges of treated groundwater allowed under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Record of Decision (US Department of

Energy 1992). All indications of nonstorm water flows were attributable to permitted discharges or natural sources.

Wet season observations are summarized in **Appendix A, Table A-4**. The Permit requires that wet season observations be conducted monthly during the wet season (October 2005 through April 2006) when significant storm events occur (a significant storm is defined as runoff lasting more than one hour). These observations are conducted at storm water influent and effluent sampling locations. Observations often indicated turbidity at both influent and effluent locations. On December 22, 2005, yellowish, discolored water was observed at influent location ALPE during an insignificant rain event. A sample was collected and analyzed for pH and temperature with results of 7.86 and 13.8 degrees C, respectively. No corrective action was taken. Another observation at this location on February 28, 2006 identified discoloration, but given the previous investigation no further action was taken. This discoloration is believed to be the result of an off-site eucalyptus grove just upstream of the sampling location. On April 30, 2006 Alameda County was observed cleaning out the storm drain during a significant rain event at influent location ALPE. This caused high turbidity in the runoff and sediment to flow on to the Livermore site. No corrective action was taken. Other than these two occurrences no other unusual conditions or anomalies were observed.

Because of higher-than-normal rainfall during this wet season, these observations occurred during significant and insignificant rain events in December 2005 and January, February, March, and April 2006. Observations were also conducted for the months of October and November 2005. However, due to storm events not occurring or occurring during non-work hours, these observations did not coincide with a significant storm event.

5.0 Storm Water Sampling and Analysis

The Permit requires collection of two samples each wet season at effluent locations ASW and WPDC, and at influent locations ALPE, ALPO, ASS2, and GRNE. Permit-driven storm water samples were collected on January 18th and March 3rd, 2006. Samples were collected as soon as possible after runoff began (most within the first hour). Water quality data from these 2005-2006 storm water samples are presented in **Appendix A**, **Tables A-5** and **A-6**. Quality assurance and quality control (QA/QC) checks are performed on all sampling and analysis from LLNL. All data analysis included standard QA/QC practices. LLNL reports on QA annually in the Site Annual Environmental Report (e.g., Peterson et al. 2005); this information is available upon request.

There are currently no numeric limits for storm water effluent. Therefore, site-specific comparison criteria were developed from historical data to identify out-of-the ordinary data values (**Table 3**). These criteria are used to identify data values that require further investigation and explanation. In addition to the Livermore site-specific comparison criteria, storm water results are compared to other published values, including: United States Environmental Protection Agency (U.S. EPA) benchmarks; *The Water Quality Control Plan, San Francisco Bay Basin (Region 2)* (Basin Plan) (SFBRWQCB 1995); US EPA and State MCLs and Ambient Water Quality Criteria (AWQC). Although these latter criteria were established for other regulatory programs, use of a broad range of criteria can help LLNL evaluate the quality of Livermore site storm water effluent. If a measured concentration is found to be higher than the

comparison criteria, but the value is the same or higher at the influent location, the source is assumed to be unrelated to Livermore site operations; therefore, further analysis is not warranted.

Table 3. Livermore site-specific threshold comparison criteria for storm water constituents of concern

Parameter	Comparison criteria
Total suspended solids (TSS)	750 mg/L [a]
Chemical oxygen demand (COD)	200 mg/L [a]
pH	<6.0, >8.5 [a]
Nitrate (as NO_3)	10 mg/L [a]
Ortho-phosphate	2.5 mg/L [a]
Beryllium	1.6 μg/L [a]
Chromium(VI)	15 μg/L [a]
Copper	13 μg/L [b]
Lead	15 μg/L [c]
Mercury	Above RL [d]
Zinc	350 μg/L [a]
Diuron	14 μg/L [a]
Oil and grease	9 mg/L [a]
Tritium	36 Bq/L [a]
Gross alpha	0.34 Bq/L [a]
Gross beta	0.48 Bq/L [a]

Note: The sources of values above these are examined to determine if any action is necessary.

a Site-specific value calculated from historical data and studies. These values are lower than the MCLs and EPA benchmarks except for zinc, TSS, and COD

b Ambient water quality criteria (AWQC)

c California and EPA drinking water action level

d RL = reporting limit = 0.0002 mg/L for mercury

5.1 Toxicity monitoring

As required by the Permit, grab samples were collected from the site storm water effluent location, WPDC, and analyzed for acute and chronic toxicity using fathead minnows (*Pimephales promelas*) as the test species. In the acute test, 96-hour survival is observed in undiluted storm water collected from location WPDC. The Permit states that an acceptable survival rate is 20 percent lower than a control sample. If the acute toxicity test is failed, the Permit requires LLNL to conduct toxicity testing during the next significant storm event. After failing two consecutive tests, LLNL must perform a toxicity reduction evaluation to identify the source of the toxicity.

The January 18, 2006 acute results showed no toxicity (100 percent survival, compared to 100 percent survival in the lab control sample) in fathead minnow at the effluent location WPDC (**Table 4a**). In the chronic fish toxicity test, storm water dilutions at 0 (Lab Control), 6.25, 12.5, 25, 50, and 100 percent (undiluted storm water at WPDC) were used to determine a dose-response relationship, if any, for both survival and growth of the fathead minnow (**Table 4b**). This test is required only at effluent location WPDC and is not conducted with water from corresponding influent locations.

From these data, no observed effect concentrations (NOECs) and lowest observed effect concentrations (LOECs) were calculated. The NOECs and LOECs for survival and growth were both 100 percent. The results demonstrate that no observed toxicity in storm water was related to operations at LLNL.

Table 4a. Single point acute fish toxicity test results for January 18, 2006

Location	Influent or Effluent	% Survival
		Replicate A
Lab Control	EPA synthetic "moderately hard" water	100
WPDC	Site Effluent	100

Table 4b. Chronic fish toxicity test results for January 18, 2006, at WPDC

Sample	7-day survival	7-day weight[a]
Concentration (%)	Avg. (%)	Avg. (mg)
Lab Control	95	0.40
12.5	100	0.40
25	100	0.37
50	95	0.43
75	100	0.47
100	100	0.50

[a] Weight of the fathead minnows at the end of the 7-day toxicity test.

5.2 Nonradioactive parameters

Table 5 contains the nonradioactive constituents that exceeded the threshold comparison criteria in **Table 3** during storms sampled in 2005-06 (full results are in **Tables A-5** and **A-6**). There were instances during 2005-06 when a nonradioactive parameter in a storm water sample exceeded LLNL specific comparison criteria listed in **Table 5**. Upstream activities near the Livermore site on the Arroyo Seco and Arroyo Las Positas include another scientific research institution, grape vineyards, and electrical transfer station, and cattle ranching that are potential sources for copper, diruon, and nitrate concentrations listed in **Table 5**. The remaining sampling results exceeding LLNL specific comparison criteria at effluent location ASW include the herbicide diuron and nitrate.

Table 5. Constituents in storm water greater than the LLNL-specific threshold comparison criteria

Constituent	Date (2005/2006)	Location	Influent or Effluent	Result	LLNL threshold criteria
Nonradioactive Parameters					
Copper	1/18/06	ALPO	Influent	20 μg/L	13 μg/L
Copper	1/18/06	ALPE	Influent	15 μg/L	13 μg/L
Copper	3/3/06	ALPO	Influent	26 μg/L	13 μg/L
Copper	3/3/06	ALPE	Influent	18 μg/L	13 μg/L
Diuron	1/18/06	ALPO	Influent	19 μg/L	14 μg/L

Constituent	Date (2005/2006)	Location	Influent or Effluent	Result	LLNL threshold criteria
Diuron	1/18/06	GRNE	Influent	3200 μg/L	14 μg/L
Diuron	1/18/06	ASW	***Effluent***	37 μg/L	14 μg/L
Diuron	3/3/06	GRNE	Influent	620 μg/L	14 μg/L
Nitrate (NO_3)	3/3/06	ASW	***Effluent***	31 mg/L	10 mg/L
Nitrate (NO_3)	1/18/06	GRNE	Influent	25 mg/L	10 mg/L
Nitrate (NO_3)	3/3/06	GRNE	Influent	23 mg/L	10 mg/L
Radioactive Parameters					
Gross Beta	3/3/06	ALPE	Influent	0.740±0.174 Bq/L	0.48 Bq/L

Diuron concentrations continue to exceed our LLNL specific comparison criteria of 14 $\mu g/L$. While most of these elevated values occur at influent locations and thus originate off-site, one result for a water sample was collected from an effluent location (ASW) on January 18th was 37 $\mu g/L$ (**Table 5**). Diuron concentration in a sample collected from the influent ASS2 on that day was <1 $\mu g/L$. Diuron is used on site as a pre-emergent herbicide under the brand names Karmex and Krovar. According to records from LLNL's gardening shop, both of these herbicides were applied during the months preceding this storm. LLNL has a policy to maintain a 15 m (50 ft) distance from the banks of the arroyos when appling the herbicide. However, this is not always possible when spraying along roadways. LLNL will continue its efforts to minimize herbicide concentrations in the arroyos at the Livermore site.

Nitrate concentrations above our comparison criteria were found in samples collected from GRNE on January 18th and from ASW and GRNE on March 3rd (**Table 5**). GRNE is an influent location and therefore the elevated nitrate values are not related to LLNL activities. The result at ASW (31 mg/L) is unusual and samples from the influent location on the arroyo (ASS2) had a nitrate concentration of 1.1 mg/L. A major restoration project on the Arroyo Seco was completed during 2005 just prior to the first rains. It is possible that additional nitrate was temporarily mobilized during this period of vegetation recovery in the arroyo. LLNL will continue to monitor nitrate concentrations at this location to identify any trends in water quality.

Chloropropham was detected at effluent location WPDC March 3rd at a concentration of 17 $\mu g/L$. On that same date water samples from the internal sampling locations around the Drainage Retention Basin (DRB), CDB, CBDX, and CDB2 contained concentrations of 7.3 $\mu g/L$, 2.5 $\mu g/L$, 14 $\mu g/L$, respectively. At sampling location GRNE the reported values was <500$\mu g/L$ (for locations see **Figure 1**). Chloropropham (also known as chlorpropham) is a herbicide and plant growth inhibitor currently only registered for uses as "Special Local Needs" under Federal Insecticide Fungicide and Rodenticide Act (FIFRA) Section 24(c) to control mouseear chickweed in spinach and fruiting in ginkgo trees, and to reduce Botrytis infection in Easter lilies (US EPA 1996). The herbicide may also be used indoors to assist in floral bud removal and to inhibit sprouting in stored potatoes. It has generally low acute toxicity and is not considered a carcinogen (US EPA 1996).

None of the above registered uses apply to activities occurring at LLNL. In addition, the LLNL gardening shop carefully maintains records of all the pesticides and qualities used. These records for the months of January to March 2006, have no record of a herbicide containing chloropropham. A survey of MSDS records for the LLNL site also did not indicate that any chemical brought on site (all of which require the MSDS

to be on file) contain any of the herbicide. The concentrations detected are low and do not pose a threat to environment. LLNL will continue to analyze storm water samples for chloropropham to see if this herbicide continues to be detected at these low concentrations.

5.3 Radioactive parameters

Environmental measurements are reported in *Système Internationale* (SI) units. The SI unit for radioactivity is the becquerel (Bq), equal to 1 nuclear disintegration per second. The more commonly used unit, picocurie (pCi), is equal to 1 nuclear disintegration per 27 seconds.

Results for gross alpha, gross beta, and tritium activities from storm water samples collected during 2005-06 are included in **Appendix A**, **Tables A-5** and **A-6**. One measurement of radioactivity (gross beta) in a storm water sample was above the LLNL specific comparison criteria of 0.48 Bq/L on March 3rd at location ALPE (**Table 5**). Given that ALPE is an influent location, upstream of LLNL activities it is likely that the result is unrelated to LLNL operations. Particles emitting beta activity are often associated with total suspended solids which were moderately high in water samples collected from location ALPE on that date (**Table A-7**).

LLNL began analyzing storm water for plutonium in runoff in 1998. Samples were analyzed from the Arroyo Seco and Arroyo Las Positas effluent locations (ASW and WPDC). The plutonium activities measured in samples from WPDC and ASW on January 18, 2006 and March 3, 2006 were below detection limit (0.0037 Bq/L, or 0.100 pCi/L).

6.0 Summary and Conclusions

The storm water monitoring program at LLNL goes beyond the requirements of the permit by sampling at more locations and for more parameters than the Permit requires. This additional monitoring is called for under the environmental monitoring requirements of various DOE Orders. Furthermore, LLNL investigates water quality parameters that are found to be above historic levels as demonstrated by the site-specific comparison criteria in **Table 2**.

Storm water observations were performed monthly during the wet season and quarterly during the dry season, with no major deficiencies noted. Inspections of best management practices (BMPs) listed in the SWPPP revealed some areas for improvement, for which corrective actions have either been made or are in progress.

A few nonradioactive parameters were above the LLNL site specific comparison criteria (**Table 5**). Most of these elevated results were at influent locations. The analytical results exceeding LLNL's site-specific comparison criteria at effluent sampling locations for nutrients and pesticides occurred at concentrations unlikely to impact receiving water quality. The acute and the chronic fish toxicity tests showed no toxicity in LLNL storm water effluent. These monitoring results suggest that operations at the LLNL Livermore site during 2005-2006 did not impact storm water quality.

7.0 References

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Acknowledgments

This report summarizes the work of many people. The authors wish to thank those who have made significant contributions to this report:

Hildy Kiefer and Beth Schad	Database management and generation of data tables.
Crystal Foster and Shari Brigdon	Annual site inspections, nonroutine releases, and general assistance.
Monique de Vasconcelos	Document preparation and distribution.
Sandra Mathews	Permitting issues and general assistance.

The authors also appreciate the hard work and dedication of: Bob Williams, Crystal Foster, Duke Ramsey, David Castro, Steve Hall, Renee Needens, and Terrance Poole. Without their conscientious field work, this report would not be possible.

APPENDIX A TABLES

A-1. Summary of nonroutine releases May 2005 - April 2006

Date of incident	Location	Type of incident
5/11/05	NW corner of B241	At 11:30 a.m. the wheel of a loader dropped into the utility pipe vault at the northwest corner of B-241. The deionized water pipeline broke. Approximately 500 gallons of deionized water spilled out, approximately 50 gallons of which flowed into the nearby landscaping. The remaining 450 gallons stayed in the concrete-lined vault and percolated into the ground. No deionized water entered the storm drain system.
5/17/05	B368	A small amount of water was used to fight a fire at B368. There was no significant fire damaged materials on the ground. There also were no storm drains in the immediate area, so all water appeared to percolate into soil. LLNL's Fire Dept. reported less than 5 gallons of water was used to fight the fire.
5/27/05	NW corner of Super Block Yard	At approximatly10:00 a.m. the hydraulic line on a forklift leaked approximately 1 quart of hydraulic fluid onto the asphalt near the Sally Port access partal at the NW corner of the Super Block Yard. It was immediately cleaned up with absorbent, which was disposed of properly.
6/2/05	S side of B327	Two oil-containing pieces of equipment staged on a pallet were tipped off the pallet by a dump truck in the area that accidentally hit the pallet. Approximately 500-700 mL of Shell Diala AX oil was released to asphalt paved surface, affecting an approximately 3 inch diameter area. Absorbent material was placed around the spill creating a dike and then LLNL staff placed absorbent material to affected area of asphalt and area was worked with brooms to remove oil and staining. The used absorbent material and the oil stained wood pallet were collected and containerized in a 55-gallon drum and the area was effectively cleaned.
7/1/05	NE of B453	At approximately 8:00 a.m. a spill of approximately 5 gallons of non-hazardous liquid adhesive was discovered on the asphalt parking lot north east of B-453. The affected area included approximately 15 square feet of asphalt surface north east of B-493 and approximately 25 square feet of soil immediately adjacent to the affected asphalt surface. The released adhesive affecting the asphalt surface was picked up with absorbent granules. The affected soil was excavated by hand and placed in a 55-gallon waste drum. None of the released material entered surface waters, storm drain, or sanitary sewer.
7/13/05	2nd Street, near B231	A vending truck was driving through the Pop-Up Barrier area when the system "popped up". The oil pan was damaged, resulting in oil released onto the asphalt and pop-up barrier concrete basin. It is estimated that no more than 3 gallons of oil was released. Dry sorb was placed on either side of the vehicle, preventing the oil from flowing into the gutters or storm drains. The oil that had collected inside the pop-up barrier concrete basin was also absorbed with dry sorb and vacuumed out and disposed of properly.
9/6/05	U291 Cooling Tower Yard	Approximately 4 ounces of sodium hypochlorite (12.5%) was released from a 55 gallon drum during the transport and unloading of several drums of sodium hypochlorite at the SE corner of the U291 Cooling Tower yard. The release occurred on asphalt and a portion of a metal grate that covered a utility vault. The bleach was cleaned up with dry sorb. The drum was

A-1. Summary of nonroutine releases May 2005 - April 2006

Date of incident	Location	Type of incident
		placed on a secondary containment pallet and observed for additional leaks. When no additional leaks were observed, the sodium hypochlorite was immediately used for normal cooling tower operations. No sodium hypochlorite reached a storm drain and all the released material was recovered. The dry sorb was disposed of as hazardous waste.
9/13/05	B622 Corp. Yard	While transferring oil from the transformer to several waste drums, approximately 3-5 gallon of oil was released to the unit and a small area of asphalt. The oil contained 11.5 parts per million PCBs. LLNL Staff collected the waste material and managed it as hazardous waste. Due to concerns over PCBs in porous asphalt, the stained asphalt will be removed.
9/13/05	B583 Construction Site	A crane blew hydraulic fluid line, releasing approximately one gallon of hydraulic fluid onto a ridge of dirt. Spill was approximately 10 yards long, was near the perimeter fence bordering the bike path south of the site. LLNL Staff responded and provided spill clean-up materials. Contaminated dirt was recovered and placed into buckets for management and disposal. No released fluid left the construction site or entered any storm drains.
9/13/05	U325	The Low Conductivity Water (LCW) system at U325 was inadvertently overfilled, resulting in a release of about 10,000 gallons of LCW to nearby storm drain.
9/14/05	Solid Waste Yard adjacent to DUS	A small fire started on the solid waste side of the yard. Approximately 200 gallons of water was used in addition to some foam to extinguish the fire. No water flowed to a storm drain. The majority of water was contained on the asphalt and evaporated away.
9/15/05	B610	A truck leaked diesel fuel at B610 (truck inspection station). An LLNL Officer noticed it and instructed the truck to leave the premises. The driver drove the truck out the east side of B610, made a left turn on East Ave, proceeded to Greenville road and drove north. A review of the route revealed diesel fuel drips leading up to and away from B610, a small spill on the S side of East Ave and additional drips on Greenville Rd. There was approximately ½ gallon of diesel spilled in B610. The Fire Department spread drysorb inside, which was swept up and disposed of it properly.
9/26/05	B431	Approximately a quart of diesel leaked from a piece of equipment at the southeast corner of B-431. The spill was located on pavement, the affected area was roughly 1' x 4'. The leak was cleaned-up with clay absorbent.
9/28/05	B133 Cooling Tower	Approximately 3 gallons of cooling tower water dripped out of the towers. Most of the water evaporated, a small amount (<.5 gallons) was observed in the catch basin, nothing appeared to be flowing out of the basin. No cooling tower water flowed off site. The nearby storm drain was protected with absorbent socks unlit repairs were made.
9/28/05	Arroyo Seco Channel Stabilization	A dump truck tipped over while loading and excavating soil. Approximately 2 gallons of oil was released, as a result of minor damage to the truck. The oil was contained to a small dirt area adjacent to the bank of the Arroyo Seco. The saturated soil was collected and placed in a 30- gallon poly container. Additional soil from the location was excavated with a backhoe and placed in a dump truck. Approximately 3 cubic yards of soil was removed. The excavated soil was removed from the dump truck, placed on

A-1. Summary of nonroutine releases May 2005 - April 2006

Date of incident	Location	Type of incident
		plastic and spread out. Inspection identified a few areas with staining and mild odor. This material was collected and placed in a 55-gallon drum, along with oil saturated soil, to be handled as hazardous waste. Remaining soil that did not have signs of contamination will be disposed of properly. All oil was recovered and was not released into the Arroyo Seco channel.
10/19/05	B517	A washing machine located at Building 517 overflowed and released between 100 and 200 gallons of wash water on to the asphalt and into the storm drainage system. The released wash water contained laundry detergent and bleach.
10/21/05	Near 361	The LLNL fire department responded to a fire in a garbage truck and used an estimated 72,000 gallons of water to put out the fire and soak the debris. Most of the water flowed into the storm drainage system. Some of the water was contained within the garbage truck, which was relocated to an area where it would drain into a sanitary sewer connection. The water that entered the storm drainage system would have flowed north to Arroyo Las Positas. Responders followed the storm drain path to the arroyo and did not observe any evidence that the water reached the arroyo.
11/18/05	Near T-3555	A small sanitary sewage line that serves the TSF cooling tower water and several small trailers backed up, releasing water through a manhole cover. The release flowed into a storm drain grate. It was estimated that approximately 200 to 300 gallons was released from the sanitary sewer. The released water was made up primarily of cooling tower water and very little sewage. The standing water observed close to the manhole was collected and put back into the sanitary sewer. The cause was a clogged sewer pipe, which has been cleared and is now functioning properly.
11/29/05	Treatment Facility E Corp. Yard	Portable tank containing ground water was knocked over by an LLNL contractor or employee. Approximately 250 gallons of ground water was released into an asphalt yard. The water did not flow directly to a storm drain or drainage swale. It was spread over a large area and slowly evaporated, no cleanup was necessary. The water contained VOCs below each of their CERCLA reportable quantities.
12/27/08	W-415 extraction well pipeline	10,200 gallons of untreated groundwater was released directly adjacent to Arroyo Seco from a leak in the pipeline that transfers untreated groundwater from Well-415 to Treatment Facility A. Standing water was observed some distance on either side of the release, but no water was seen flowing from the immediate area. The untreated groundwater contained a total of 21 ppb of VOCs, well below the CERCLA reportable quantity. A sample for EPA601 analysis was taken from TFG-ASW, the receiving water station downstream of the leak and prior to Arroyo Seco leaving LLNL property. Preliminary results were non-detect.
1/24/06	B294	Approximately 25 gallons of DI water was released inside the laboratory in B294. A small volume of water exited the building and made its way to a nearby storm drain inlet. The pavement surrounding the inlet was observed to be wet, but there was no standing water in the storm drain inlet. The water had not migrated from the immediate vicinity of B294. The fire department placed drysorb around the inlet. It is estimated that no more

A-1. Summary of nonroutine releases May 2005 - April 2006

Date of incident	Location	Type of incident
		than 3-4 gallons actually entered the drain inlet.
2/2/06	B235	Less than 4 gallons of antifreeze were released from a portable electric generator located south of B-235 by the loading dock. The release was inaccessible until the next day due to security operations. Cleanup was performed early the next morning. Upon close inspection of the drainage swale leading to the storm drain grate and the pooled water in the bottom of the catch basin, there was no evidence that the antifreeze reached the catch basin. All spilled antifreeze was recovered with absorbent material and disposed of properly.
2/3/06	B431	About 8 ounces of oil was spilled when oil was drained from a bridge crane. The spill was on concrete and was immediately cleaned up.
2/8/06	NIF CDA utility pad	A compressor oil leak released approximately 2 gallons of oil to the concrete pad beneath the compressor. Approximately 25 square feet of concrete surface was affected. An additional 2 square feet of gravel immediately adjacent to the pad on the east side had been affected by the oil release. The affected gravel and soil was excavated and managed as hazardous waste along with the clean up materials generated the day before. None of the oil released entered the storm drain, sanitary sewer, or surface water.
2/9/06	B431	Approximately 0.5 gallon of hydraulic oil was spilled on asphalt when an excavator broke a line. The oil was immediately cleaned up with clay absorbent.
2/11/06	West of B152	Approximately 0.5 gallon of antifreeze leaked from a contractor vehicle, just west of B152 onto an asphalt parking lot. The liquid remained localized in the area of the vehicle. The liquid was adsorbed using approximately 15 pounds of diatomaceous earth. The solid waste was disposed of in the municipal trash.
2/14/06	T6203	Due to a blockage in the main line, sewage backed up and overflowed out a clean out port located on the southwest side of the trailer. Approximately 3 gallons of sewage was released. It flowed down a slight incline, leaving a visible trail on asphalt that ended in a dirt area adjacent to the parking lot. Sewage appeared to stop flowing once it reached the edge of the dirt area. The dirt in this area appeared wet and a visible trail was noticeable approximately half way down a small incline that ended in the drainage swale located along S Outer Loop Rd. It did not appear that any sewage reached the drainage swale. A light application of bleach solution was applied to the asphalt area, as well as the dirt area near the clean out port.
2/21/06	B431	Approximately 4 ounces of hydraulic fluid was spilled while changing lines at B431. The spill was immediately cleaned up with clay absorbent.
3/18/06	B194	LLNL began investigating the possibility of a LCW system leak in November 2005 when tank level charts indicated a system loss. The system losses increased each month until the leak was discovered. This type of gradually increasing loss rate indicates a break or separation in an underground pipe that is slowly widening. These types of leaks are difficult to find and are usually discovered when the ground saturates to the point that the water surfaces, or flows into a utility box. Field crews discovered

A-1. Summary of nonroutine releases May 2005 - April 2006

Date of incident	Location	Type of incident
		the suspected leak site on March 18, when water surfaced in a graveled area east of Building 194. The LCW leak was confirmed on March 21 when the area was excavated and the leak was patched. Repairs were made on March 25, 2006. No evidence of the discharge of the LCW to surface water drainage courses was seen. Estimate for actual release over a 6-month period was 600,000 gallons of LCW.
4/5/06	B231 south side	A gasoline tank on an LLNL truck was ruptured by a pop-up security barrier. Approximately 20 gallons of gasoline was released on to the asphalt and into the storm drainage system. The flow was tracked to the outfall of a storm drain culvert at Arroyo Las Positas. The Arroyo was flowing heavily due to recent rain. Responders deployed absorbent material in the stilled area at the culvert outfall and two strings of oil absorbing booms were deployed across the arroyo. Samples were obtained immediately downstream of the culvert and at the location where the arroyo leaves LLNL property and are reported in this document (Table 2).
4/20/06	Ave. G, south of Outer Loop Road	A blown hydraulic line from an asphalt paving machine spilled approx. 2 gallons of hydraulic fluid onto new un-compacted asphalt material that was piled on top of existing asphalt. Cleanup began immediately and no oil appeared to have contacted base-rock or soil. All asphalt in the area is to be removed as part of the repaving project.

Table A-2. Summary of best management practice inspections in potential pollutant source/industrial activity areas

Directorate Responsible for Potential Pollutant Source/Industrial Activity	Deficiencies in BMPs or BMP Implementation and Additional/Revised BMPs or Corrective Actions.
Laboratory Services Directorate	B404: The staged batteries should be covered or effort made to reduce contact with rain. Compost pile: Straw waddles should be replaced to minimize erosion. B622 Yard: Storage of transformers in this yard could be improved by avoiding contact with rain or providing secondary containment. Also, used absorbent material should be removed from the ground and when possible, machinery and equipment covered, to avoid contact with rain. B619 area: Outside storage of the fan blade would be improved by covering it to avoid contact with rain. T5299, T6298, T6297 Yards: Outside storage of liquid containers, rusty equipment and raw materials could be improved with a cover or secondary containment.
Energy and Environment	No deficiencies were found.
National Ignition Facility	No deficiencies were found.
Computation Directorate	B041: Outside storage of materials could benefit from good housekeeping and the trash dumpsters need lids. T4525, T3724, T3726: The storm drain near by needs to be cleaned.
Nonproliferation, Arms Control, and International Security and Homeland Security	No deficiencies were found
Physics and Advanced Technologies	B197: A french drain receiving condensate from an air humidifier was clogged. B161, T1726, B194, B341, B423, B445: Various pieces of equipment should be covered to avoid contact with rain. B176: A small grit leak was identified in a sand-blasting unit, which will be repaired. Metal cuttings found on the ground will be swept and disposed of properly.
Engineering	No deficiencies were found.
Safety and Environmental Protection	B438: Storm drain near-by requires cleaning North side of TFD: An open top, unlabeled, container collecting water and a rusted Carbtol drum were found outside. TFE-HS: There was a small water leak from this treatment unit that was pudding water. TF406-NW: An open top bucket was being used to collect condensate. B406: Unlabeled drums were found stored outside and improved housekeeping will be considered. TFD and TFG-N: Liquid containers were stored outside without a cover or secondary containment T2679: Insulation was observed flaking from RCUA-2-2N and should be repaired. B253: A vacuum pump on the north side of the building is leaving residue on the building. B323 and B324: Two carboys labeled 'bad foam' were stored

Table A-2. Summary of best management practice inspections in potential pollutant source/industrial activity areas (continued)

Directorate Responsible for Potential Pollutant Source/Industrial Activity	Deficiencies in BMPs or BMP Implementation and Additional/Revised BMPs or Corrective Actions.
	outside of B323 and a DEC server outside of B324
Safeguards and Security	No deficiencies were found
Biosciences Directorate	B361 Increment 3 and T3703: A 3.4 inch copper drain/vent line was unlabeled. The source will be identified to determine if it falls under acceptable nonstorm water discharges listed in the SWPPP or if the line should be plugged or routed to the sanitary sewer. B376: A pressure washer stored outside will be moved into covered storage. B361, 362, 363, 365, and B3777: A series of good housecleaning observations need to be addressed including storage of photo trays outside on the ground, rusty pipes and other materials, and an old refrigerator and centrifuge. B363, T3703 and T3777: Plastic sheeting and fiberglass insulation on outside piping is deteriorating and should be replaced or repainted. B361, T3469, B366 T3707, T3703, T3725, B365, B364: Storm drains near these building and trailers need to be cleaned.
Administration and Human Resources	No deficiencies were found.
Chemistry and Materials Science	No deficiencies were found.
Chief Financial Officer	No deficiencies were found.
Defense and Nuclear Technologies Directorate	No deficiencies were found.
Director's Office	No deficiencies were found.

Table A-3. Record of dry Season Visual Obersvations

Location	Date	Time	Floating Material, Debris, Odor, Discolorations, or Oil and Gease?	Observations	Description
ALPE	28-Jun-05	01:12 PM	Leaves, sticks, paper, bottles, plastic	Sediment build-up	
ALPO	28-Jun-05	01:15 PM	Leaves, sticks, paper, plastic		
GRNE	28-Jun-05	01:17 PM	Leaves, sticks, paper		
ASS2	28-Jun-05	01:24 PM	Leaves, sticks		
ASW	28-Jun-05	01:31 PM	Leaves, sticks, paper, plastic		No corrective action taken,ERD's treatment facility A discharging
WPDC	28-Jun-05	02:23 PM	Leaves, sticks, paper, plastic		No corrective action taken, ERD's Treatment Facility B & DRB discharging
B111	28-Jun-05	02:35 PM	Leaves, sticks		
B341	28-Jun-05	02:46 PM	None		
B391	28-Jun-05	02:50 PM	Leaves, sticks		
B194	28-Jun-05	02:55 PM	None	Clean	
B191 HEAF	28-Jun-05	03:06 PM	None	Clean	

Table A-3. Record of dry Season Visual Obersvations

Location	Date	Time	Floating Material, Debris, Odor, Discolorations, or Oil and Gease?	Observations	Description
B551W	28-Jun-05	03:10 PM	Leaves, sticks		
LABOR ONLY CONCRETE WASH AREA NEAR PARKING LOT F-2	28-Jun-05	03:17 PM	Leaves, sticks		Evidence of wash water inside containment area. No corrective action taken.
Ave. “K” Stormline	28-Jun-05	03:26 PM	Leaves, sticks, paper, cans, plastic		
ALPE	20-Sep-05	02:20 PM	Leaves, sticks, paper, plastic		
ALPO	20-Sep-05	02:26 PM	Leaves, sticks, paper, plastic		
GRNE	20-Sep-05	02:28 PM	Leaves, sticks, paper, plastic		
ASS2	20-Sep-05	02:36 PM	Leaves, sticks		
B111	20-Sep-05	02:46 PM	Leaves, sticks		
ASW	20-Sep-05	02:50 PM	Leaves, sticks, paper, plastic		No corrective action taken,prior evidence of ERD’s treatment facility A discharging
WPDC	20-Sep-05	02:58 PM	Leaves, sticks		No corrective action taken, ERD’s Treatment Facility B & DRB discharging
LABOR ONLY CONCRETE WASH AREA NEAR PARKING LOT F-2	20-Sep-05	03:04 PM	None		n/a

Table A-3. Record of dry Season Visual Obersvations

Location	Date	Time	Floating Material, Debris, Odor, Discolorations, or Oil and Gease?	Observations	Description
B551W	20-Sep-05	03:08 PM	Leaves, sticks, paper		
B341	20-Sep-05	03:12 PM	Leaves, paper		
B391	20-Sep-05	03:14 PM	Leaves, sticks, paper		
B194	20-Sep-05	03:20 PM	None	Very Clean	
B191 HEAF	20-Sep-05	03:23 PM	None		
AVE. “K” STORMLINE	20-Sep-05	03:51 PM	Leaves, sticks, paper, cans, plastic		

Table A-4. Record of Wet Season Visual Observations

Location	Date	Time	Floating Material, Debris, Odor, Discolorations, or Oil and Gease?	Turbidity	Runoff	Additional Observations
ALPE	25-Oct-05	03:08 PM	Leaves, sticks, paper	No	No Runoff	
ALPO	25-Oct-05	03:12 PM	Leaves, sticks, paper, plastic	No	No Runoff	
GRNE	25-Oct-05	03:15 PM	Leaves, paper,sticks	No	No Runoff	Styrofoam
ASS2	25-Oct-05	03:25 PM	Leaves, sticks	No	No Runoff	
ASW	25-Oct-05	03:30 PM	Leaves, sticks, paper, plastic	No	No Runoff	Styrofoam
WPDC	25-Oct-05	03:35 PM	Leaves, sticks, paper, plastic	No	No Runoff	DRB & ERD Treatment Facility B discharging
CDBX	25-Oct-05	03:40 PM	Plastic	No	No Runoff	Algae
CDB2	25-Oct-05	03:43 PM	Leaves, sticks, cans	No	No Runoff	
CDB	25-Oct-05	03:50 PM	Leaves, sticks	No	No Runoff	Styrofoam
ALPE	29-Nov-05	10:46 AM	Leaves, sticks, paper	No	No Runoff	
ALPO	29-Nov-05	10:51 AM	Leaves, sticks, paper, plastic	No	No Runoff	Styrofoam
GRNE	29-Nov-05	10:54 AM	Leaves, sticks, paper, plastic	No	No Runoff	Styrofoam

Table A-4. Record of Wet Season Visual Observations

Location	Date	Time	Floating Material, Debris, Odor, Discolorations, or Oil and Gease?	Turbidity	Runoff	Additional Observations
ASS2	29-Nov-05	11:02 AM	Leaves, sticks	No	No Runoff	
ASW	29-Nov-05	11:10 AM	Leaves, sticks, plastic	No	No Runoff	Sediment build-up
WPDC	29-Nov-05	11:15 AM	Leaves, sticks, paper	No	No Runoff	
CDB	29-Nov-05	01:10 PM	Leaves, sticks, paper	No	No Runoff	
CDB2	29-Nov-05	01:16 PM	Leaves, paper, sticks	No	No Runoff	Standing water
CDBX	29-Nov-05	01:20 PM	Leaves, sticks	No	No Runoff	Algae
ALPE	22-Dec-05	08:43 AM	Yellowish color, leaves, sticks, paper	No	Insignificant	pH & temperature taken due to discoloration
ALPO	22-Dec-05	08:47 AM	Leaves, sticks, paper	No	Insignificant	
GRNE	22-Dec-05	08:49 AM	Leaves, sticks	No	Insignificant	
ASS2	22-Dec-05	08:59 AM	Leaves, sticks	No	No Runoff	
ASW	22-Dec-05	09:02 AM	Leaves, sticks, plastic	No	No Runoff	
WPDC	22-Dec-05	09:12 AM	Leaves, sticks, paper	No	No Runoff	DRB & Treatment Facility B discharging

Table A-4. Record of Wet Season Visual Observations

Location	Date	Time	Floating Material, Debris, Odor, Discolorations, or Oil and Gease?	Turbidity	Runoff	Additional Observations
CDBX	22-Dec-05	09:20 AM	Leaves, sticks	No	No Runoff	DRB discharging
CDB2	22-Dec-05	09:27 AM	Leaves, sticks, styrofoam, paper, cans, plastic	No	Insignificant	
CDB	22-Dec-05	09:32 AM	Leaves, sticks	No	No Runoff	
ALPO	18-Jan-06	01:20 PM	Sediment	Low-moderate	Significant	
ASS2	18-Jan-06	01:40 PM	Leaves, sticks, paper, plastic	No	Significant	
ALPE	18-Jan-06	01:55 PM	Sediment, plastic	Moderate	Significant	
ASW	18-Jan-06	01:55 PM	Leaves, sticks	No	Significant	
CDB2	18-Jan-06	02:00 PM	Leaves, twigs	Light brown in color	Significant	
WPDC	18-Jan-06	02:10 PM	Leaves, sticks	No	Significant	
GRNE	18-Jan-06	02:15 PM		Low-none	Significant	
CDBX	18-Jan-06	02:30 PM	Leaves, sticks, plastic	Very little	Significant	
CDB	18-Jan-06	02:50 PM	Brown color	Greyish, brown	Significant	

Table A-4. Record of Wet Season Visual Observations

Location	Date	Time	Floating Material, Debris, Odor, Discolorations, or Oil and Gease?	Turbidity	Runoff	Additional Observations
ASS2	28-Feb-06	11:12 AM	Leaves, sticks	No	No Runoff	
ASW	28-Feb-06	11:15 AM	Leaves, sticks, paper	No	No Runoff	ERD Treatment Facility A discharging
WPDC	28-Feb-06	11:21 AM	Leaves, sticks, paper, plastic	Clear	Significant	ERD Treatment Facility B and DRB discharging
GRNE	28-Feb-06	11:26 AM	Sticks, plastic	No	Insignificant	
ALPO	28-Feb-06	11:30 AM	Sticks, plastic, leaves, paper	Cloudy	Significant	
ALPE	28-Feb-06	11:34 AM	Plastic, orange color, sticks, leaves, cans	Cloudy	Significant	
CDBX	28-Feb-06	02:51 PM	Sticks, leaves, paper	No	No Runoff	DRB releasing
CDB2	28-Feb-06	02:58 PM	Sticks, plastic, leaves, cans, paper	No	Insignificant	
CDB	28-Feb-06	03:04 PM	Sticks, leaves, paper	No	Insignificant	
GRNE	03-Mar-06	08:10 AM		Low-none	Significant	
ASS2	03-Mar-06	08:15 AM	Sticks, leaves	Moderate	Significant	
ASW	03-Mar-06	08:30 AM	Sticks, leaves	Slightly moderate	Significant	

Table A-4. Record of Wet Season Visual Observations

Location	Date	Time	Floating Material, Debris, Odor, Discolorations, or Oil and Gease?	Turbidity	Runoff	Additional Observations
ALPE	03-Mar-06	08:30 AM	Brown-tannish color	High from road ~ 1/3 flow	Significant	Water is dirty- sediment from road run-off and the tan color from agriculture
WPDC	03-Mar-06	08:40 AM		No	Significant	
ALPO	03-Mar-06	08:50 AM	Turbidity, leaves, sticks	Moderate	Significant	
CDBX	03-Mar-06	09:20 AM	Sticks, leaves	Mild	No Runoff	
CDB2	03-Mar-06	09:30 AM		Moderate	Significant	
CDB	03-Mar-06	09:40 AM	Sticks, leaves	Moderate	No Runoff	
ALPE	30-Mar-06	10:00 AM	Sediment	High	Significant	County storm drain clean out, sediment high flowing on site to Outer Loop Rd caused by the county, not LLNL
ALPE	04-Apr-06	09:40 AM	Leaves, sticks, plastic	Moderate	Significant	
ALPO	04-Apr-06	09:46 AM	Leaves, sticks, paper	Moderate to high	Significant	Tire, Foamy
GRNE	04-Apr-06	09:52 AM	Leaves, sticks, plastic	Low	Significant	
ASS2	04-Apr-06	10:06 AM	Leaves, sticks	High	Significant	

Table A-4. Record of Wet Season Visual Observations

Location	Date	Time	Floating Material, Debris, Odor, Discolorations, or Oil and Gease?	Turbidity	Runoff	Additional Observations
ASW	04-Apr-06	10:17 AM	Leaves, sticks	Moderate to high	Significant	
WPDC	04-Apr-06	10:32 AM	Leaves, sticks, cans	Moderate	Significant	
CDB2	04-Apr-06	10:46 AM	Leaves, sticks, cans, paper	Moderate	Significant	
CDBX	04-Apr-06	10:52 AM		Moderate to high	Significant	
CDB	04-Apr-06	11:07 AM	Leaves, sticks, paper	Moderate	Significant	

Table A-5. Storm water quality data for January 18, 2006.

DESCRIBE DISCHARGE LOCATION	DATE/TIME OF SAMPLE COLLECTION	TIME DISCHARGE STARTED	ANALYTICAL RESULTS For First Storm Event						
			BASIC PARAMETERS					OTHER PARAMETERS	
			pH	TSS	SC	O&G	TOC	Aluminum	Arsenic
WPDC (ALP Effluent)	1/18/06 AM ☐ 14:10 PM ☒	Ongoing AM ☐ PM ☒	8.03	91	270	<5	4.3	3.2	<0.002
GRNE (ALP Influent)	1/18/06 AM ☐ 14:15 PM ☒	Ongoing AM ☐ PM ☒	7.72	14	180	<5	8.3	0.9	0.490
ALPO (ALP Influent)	1/18/06 AM ☐ 13:20 PM ☒	Ongoing AM ☐ PM ☒	8.34	260	1100	<5	8.2	10.0	0.010
ALPE (ALP Influent)	1/18/06 AM ☐ 13:55 PM ☒	Ongoing AM ☐ PM ☒	8.38	160	1600	<5	16	8.7	0.004
TEST REPORTING UNITS:			**pH Units**	**mg/L**	**µmhos/cm**	**mg/L**	**mg/L**	**mg/L**	**mg/L**
TEST METHOD USED:			E150.1	E160.2	E120.1	E1664	E415.1	E200.7	E200.7
ANALYZED BY (SELF/LAB):			BC Labs	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs

ALP - Arroyo Las Positas
TSS - Total Suspended Solids
SC - Specific Conductance
O&G - Oil & Grease
TOC - Total Organic Carbon
Test Method Used: E is EPA Method and SM is Standard methods for the examination of water and wastewater

Table A-5. Storm water quality data for January 18, 2006.

DESCRIBE DISCHARGE LOCATION	ANALYTICAL RESULTS For First Storm Event							
	OTHER PARAMETERS							
	Barium	Beryllium	Boron	Bromacil	Cadmium	Calcium	Chloropropham	Chemical Oxygen Demand
WPDC (ALP Effluent)	0.074	<0.0002	0.27	2.0	<0.0010	18	<1.0	49
GRNE (ALP Influent)	0.068	<0.0002	0.16	0.5	<0.0010	13	<1.0	42
ALPO (ALP Influent)	0.23	0.0002	3.90	3.9	<0.0010	51	<1.0	60
ALPE (Influent)	0.16	<0.0002	5.90	NA	<0.0010	37	<1.0	99
TEST REPORTING UNITS:	**mg/L**	**mg/L**	**mg/L**	**µg/L**	**mg/L**	**mg/L**	**µg/L**	**mg O/ L**
TEST METHOD USED:	E200.7	E200.7	E200.7	E525	E200.7	E200.7	E632	E410.4
ANALYZED BY (SELF/LAB):	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs

TSS - Total Suspended Solids
SC - Specific Conductance
O&G - Oil & Grease
TOC - Total Organic Carbon
Test Method Used: E is EPA Method and SM is Standard methods for the examination of water and wastewater
Note: concentrations in boldface print exceed LLNL's site-specific threshold criteria.

Table A-5. Storm water quality data for January 18, 2006.

DESCRIBE DISCHARGE LOCATION	ANALYTICAL RESULTS For First Storm Event							
	OTHER PARAMETERS							
	Chromium	Copper	Diazinon	Diuron	Glyphosate	Hexavalent Chromium	Lead	Mercury
WPDC (ALP Effluent)	0.015	0.011	<0.5	13	<25	0.0025	0.0043	<0.0002
GRNE (ALP Influent)	<0.003	0.007	<0.5	3200	130	<0.0020	<0.0010	<0.0002
ALPO (ALP Influent)	0.018	0.018	<0.5	19	<25	<0.0020	0.0052	<0.0002
ALPE (ALP Influent)	0.021	0.021	<0.5	<1	48	<0.0020	0.0058	<0.0002
TEST REPORTING UNITS:	**mg/L**	**mg/L**	**µg/L**	**µg/L**	**µg/L**	**mg/L**	**mg/L**	**mg/L**
TEST METHOD USED:	E200.7	E200.7	E525	E632	E547	E200.7	E200.7	E200.7
ANALYZED BY (SELF/LAB):	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs

TSS - Total Suspended Solids
SC - Specific Conductance
O&G - Oil & Grease
TOC - Total Organic Carbon
Test Method Used: E is EPA Method and SM is Standard methods for the examination of water and wastewater
Note: concentrations in boldface print exceed LLNL's site-specific threshold criteria.

Table A-5. Storm water quality data for January 18, 2006.

DESCRIBE DISCHARGE LOCATION	ANALYTICAL RESULTS For First Storm Event							
	OTHER PARAMETERS							
	Nickel	Nitrate (asNO3)	Ortho-Phosphate	Potassium	Total Hardness	Total Dissolved Solids	Total PCBs	Zinc
WPDC (ALP Effluent)	0.011	6.4	0.14	2.0	79	170	<0.2	0.110
GRNE (ALP Influent)	0.004	25.0	0.67	1.7	50	130	NA	0.096
ALPO (ALP Influent)	0.020	4.0	0.99	3.7	220	860	NA	0.061
ALPE (Influent)	0.025	2.2	1.60	5.4	180	950	NA	0.042
TEST REPORTING UNITS:	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**µg/L**	**mg/L**
TEST METHOD USED:	E200.7	E300.0	E365.1	E200.7	SM2340B	E160.1	E8082A	E200.7
ANALYZED BY (SELF/LAB):	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs

TSS - Total Suspended Solids
SC - Specific Conductance
O&G - Oil & Grease
TOC - Total Organic Carbon
Test Method Used: E is EPA Method and SM is Standard methods for the examination of water and wastewater

Table A-5. Storm water quality data for January 18, 2006.

DESCRIBE DISCHARGE LOCATION	ANALYTICAL RESULTS For First Storm Event			
	OTHER PARAMETERS			
	Gross alpha	Gross beta	Tritium	Plutonium 230+240
WPDC (ALP Effluent)	0.046±0.027	0.170±0.044	2.22±2.18	<0.0037
GRNE (ALP Influent)	0.005±0.014	0.100±0.036	0.40±2.11	N/A
ALPO (ALP Influent)	0.080±0.104	0.265±0.074	5.40±2.26	N/A
ALPE (Influent)	0.156±0.081	0.264±0.070	0.39±2.07	N/A
TEST REPORTING UNITS:	**Bq/L**	**Bq/L**	**Bq/L**	**Bq/L**
TEST METHOD USED:	E900	E900	E906	AS:PUISO
ANALYZED BY (SELF/LAB):	Eberline	Eberline	Eberline	Eberline

Radioactivities are reported as the measured concentration and an uncertainty (s +/-2 counting error). If the concentration is less than or equal to the uncertainty, the result is considered to be a nondetection.

TSS - Total Suspended Solids

SC - Specific Conductance

O&G - Oil & Grease

TOC - Total Organic Carbon

Test Method Used: E is EPA Method and SM is Standard methods for the examination of water and wastewater

Table A-5. Storm water quality data for January 18, 2006.

DESCRIBE DISCHARGE LOCATION	DATE/TIME OF SAMPLE COLLECTION	TIME DISCHARGE STARTED	ANALYTICAL RESULTS For First Storm Event						
			BASIC PARAMETERS					OTHER PARAMETERS	
			pH	TSS	SC	O&G	TOC	Aluminum	Arsenic
ASW (Arroyo Seco Effluent)	1/18/06 AM ☐ 13:55 PM ☒	Ongoing AM ☐ PM ☒	7.22	83	52	<5	4.5	2.2	<0.002
ASS2 (Arroyo Seco Influent)	1/18/06 AM ☐ 13:40 PM ☒	Ongoing AM ☐ PM ☒	7.32	26	41	<5	4.4	1.3	<0.002
TEST REPORTING UNITS:			**pH Units**	**mg/L**	**µmhos/cm**	**mg/L**	**mg/L**	**mg/L**	**mg/L**
TEST METHOD USED:			E150.1	E160.2	E120.1	E1664	E415.1	E200.7	E200.7
ANALYZED BY (SELF/LAB):			BC Labs	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs

TSS - Total Suspended Solids
SC - Specific Conductance
O&G - Oil & Grease
TOC - Total Organic Carbon
Test Method Used: E is EPA Method and SM is Standard methods for the examination of water and wastewater

Table A-5. Storm water quality data for January 18, 2006.

DESCRIBE DISCHARGE LOCATION	ANALYTICAL RESULTS For First Storm Event							
	OTHER PARAMETERS							
	Barium	Beryllium	Boron	Bromacil	Cadmium	Calcium	Chloropropham	Chemical Oxygen Demand
ASW (Arroyo Seco Effluent)	0.045	<0.0002	0.10	<0.62	<0.001	4	<1	37
ASS2 (Arroyo Seco Influent)	0.029	<0.0002	0.14	0.64	<0.001	3	<1	39
TEST REPORTING UNITS:	**mg/L**	**mg/L**	**mg/L**	**µg/L**	**mg/L**	**mg/L**	**µg/L**	**mg O/ L**
TEST METHOD USED:	E200.7	E200.7	E200.7	E525	E200.7	E200.7	E632	E410.4
ANALYZED BY (SELF/LAB):	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs

TSS - Total Suspended Solids
SC - Specific Conductance
O&G - Oil & Grease
TOC - Total Organic Carbon
Test Method Used: E is EPA Method and SM is Standard methods for the examination of water and wastewater

Table A-5. Storm water quality data for January 18, 2006.

DESCRIBE DISCHARGE LOCATION	ANALYTICAL RESULTS For First Storm Event							
	OTHER PARAMETERS							
	Chromium	Copper	Diazinon	Diuron	Glyphosate	Hexavalent Chromium	Lead	Mercury
ASW (Arroyo Seco Effluent)	0.0086	0.011	<0.62	37	<25	<0.002	0.0057	<0.0002
ASS2 (Arroyo Seco Influent)	0.0032	0.008	<0.50	<1	<25	<0.002	0.0015	<0.0002
TEST REPORTING UNITS:	**mg/L**	**mg/L**	**µg/L**	**µg/L**	**µg/L**	**mg/L**	**mg/L**	**mg/L**
TEST METHOD USED:	E200.7	E200.7	E525	E632	E547	E200.7	E200.7	E200.7
ANALYZED BY (SELF/LAB):	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs

TSS - Total Suspended Solids
SC - Specific Conductance
O&G - Oil & Grease
TOC - Total Organic Carbon
Test Method Used: E is EPA Method and SM is Standard methods for the examination of water and wastewater

Table A-5. Storm water quality data for January 18, 2006.

DESCRIBE DISCHARGE LOCATION	ANALYTICAL RESULTS For First Storm Event							
	OTHER PARAMETERS							
	Nickel	Nitrate (asNO3)	Ortho-Phosphate	Potassium	Total Hardness	Total Dissolved Solids	TOTAL PCB	Zinc
ASW (Arroyo Seco Effluent)	0.009	1.3	0.24	1.7	17	21	<0.2	0.093
ASS2 (Arroyo Seco Influent)	0.012	0.6	0.32	1.2	12	51	NA	0.150
TEST REPORTING UNITS:	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**µg/L**	**mg/L**
TEST METHOD USED:	E200.7	E300.0	E365.1	E200.7	SM2340B	E160.1	E8082A	E200.7
ANALYZED BY (SELF/LAB):	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs

TSS - Total Suspended Solids
SC - Specific Conductance
O&G - Oil & Grease
TOC - Total Organic Carbon
Test Method Used: E is EPA Method and SM is Standard methods for the examination of water and wastewater

Table A-5. Storm water quality data for January 18, 2006.

DESCRIBE DISCHARGE LOCATION	ANALYTICAL RESULTS For First Storm Event			
	OTHER PARAMETERS			
	Gross alpha	Gross beta	Tritium	Plutonium 230+240
ASW (Arroyo Seco Effluent)	0.033±0.018	0.115±0.037	4.11±2.22	<0.0037
ASS2 (Arroyo Seco Influent)	0.002±0.014	0.084±0.030	1.85±2.15	N/A
TEST REPORTING UNITS:	**Bq/L**	**Bq/L**	**Bq/L**	**Bq/L**
TEST METHOD USED:	E900	E900	E906	AS:PUISO
ANALYZED BY (SELF/LAB):	Eberline	Eberline	Eberline	Eberline

Radioactivities are reported as the measured concentration and an uncertainty (s +/-2 counting error). If the concentration is less than or equal to the uncertainty, the result is considered to be a nondetection.

TSS - Total Suspended Solids

SC - Specific Conductance

O&G - Oil & Grease

TOC - Total Organic Carbon

Test Method Used: E is EPA Method and SM is Standard methods for the examination of water and wastewater

Table A-6. Storm water quality data for March 3, 2006.

DESCRIBE DISCHARGE LOCATION	DATE/TIME OF SAMPLE COLLECTION	TIME DISCHARGE STARTED	ANALYTICAL RESULTS For Second Storm Event						
			BASIC PARAMETERS					OTHER PARAMETERS	
			pH	TSS	SC	O&G	TOC	Aluminum	Arsenic
WPDC (ALP Effluent)	3/3/06 8:40 AM [X] PM [ ]	Ongoing AM [X] PM [ ]	7.85	44	220	<5.0	3.8	2.3	<0.002
GRNE (ALP Influent)	3/3/06 8:06 AM [X] PM [ ]	Ongoing AM [X] PM [ ]	7.54	14	180	7.8	2.8	2.4	0.016
ALPO (ALP Influent)	3/3/06 8:50 AM [X] PM [ ]	Ongoing AM [X] PM [ ]	8.22	260	1100	<5.0	7.7	12.0	0.008
ALPE (ALP Influent)	3/3/06 8:30 AM [X] PM [ ]	Ongoing AM [X] PM [ ]	8.32	290	1500	<5.0	21	12.0	0.005
TEST REPORTING UNITS:			**pH Units**	**mg/L**	**µmhos/cm**	**mg/L**	**mg/L**	**mg/L**	**mg/L**
TEST METHOD USED:			E150.1	E160.2	E120.1	E1664	E415.1	E200.7	E200.7
ANALYZED BY (SELF/LAB):			BC Labs	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs

ALP - Arroyo Las Positas
TSS - Total Suspended Solids
SC - Specific Conductance
O&G - Oil & Grease
TOC - Total Organic Carbon
Test Method Used: E is EPA Method and SM is Standard methods for the examination of water and wastewater

Table A-6. Storm water quality data for March 3, 2006.

DESCRIBE DISCHARGE LOCATION	ANALYTICAL RESULTS For Second Storm Event							
	OTHER PARAMETERS							
	Barium	Beryllium	Boron	Bromacil	Cadmium	Calcium	Chloropropham	Chemical Oxygen Demand
WPDC (ALP Effluent)	0.055	<0.0002	0.28	1.3	<0.0005	14	17	29
GRNE (ALP Influent)	0.069	<0.0002	0.15	8.4	<0.0005	10	<500	25
ALPO (ALP Influent)	0.260	0.0004	3.60	920	<0.0005	44	<1	43
ALPE (Influent)	0.190	0.0003	6.90	1.2	<0.0005	38	<1	120
TEST REPORTING UNITS:	**mg/L**	**mg/L**	**mg/L**	**µg/L**	**mg/L**	**mg/L**	**µg/L**	**mg O/ L**
TEST METHOD USED:	E200.7	E200.7	E200.7	E525	E200.7	E200.7	E632	E410.4
ANALYZED BY (SELF/LAB):	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs

TSS - Total Suspended Solids

SC - Specific Conductance

O&G - Oil & Grease

TOC - Total Organic Carbon

Test Method Used: E is EPA Method and SM is Standard methods for the examination of water and wastewater

Note: concentrations in boldface print exceed LLNL's site-specific threshold criteria.

Table A-6. Storm water quality data for March 3, 2006.

DESCRIBE DISCHARGE LOCATION	ANALYTICAL RESULTS For Second Storm Event							
	OTHER PARAMETERS							
	Chromium	Copper	Diazinon	Diuron	Glyphosate	Hexavalent Chromium	Lead	Mercury
WPDC (ALP Effluent)	0.009	0.007	<0.2	5	<25	<0.002	<0.005	<0.0002
GRNE (ALP Influent)	0.005	0.005	<0.2	620	30	<0.002	<0.005	<0.0002
ALPO (ALP Influent)	0.002	0.026	<0.2	8	<25	<0.002	0.008	<0.0002
ALPE (ALP Influent)	0.028	0.018	<0.2	<1	<25	<0.002	0.008	<0.0002
TEST REPORTING UNITS:	**mg/L**	**mg/L**	**µg/L**	**µg/L**	**µg/L**	**mg/L**	**mg/L**	**mg/L**
TEST METHOD USED:	E200.7	E200.7	E525	E632	E547	E200.7	E200.7	E200.7
ANALYZED BY (SELF/LAB):	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs

TSS - Total Suspended Solids
SC - Specific Conductance
O&G - Oil & Grease
TOC - Total Organic Carbon
Test Method Used: E is EPA Method and SM is Standard methods for the examination of water and wastewater
Note: concentrations in boldface print exceed LLNL's site-specific threshold criteria.

Table A-6. Storm water quality data for March 3, 2006.

DESCRIBE DISCHARGE LOCATION	ANALYTICAL RESULTS For Second Storm Event							
	OTHER PARAMETERS							
	Nickel	Nitrate (asNO3)	Ortho-Phosphate	Potassium	Total Hardness	Total Dissolved Solids	Total PCBs	Zinc
WPDC (ALP Effluent)	0.007	3.9	0.15	1.6	60	150	<0.2	0.082
GRNE (ALP Influent)	0.004	23.0	0.67	1.6	40	100	N/A	0.100
ALPO (ALP Influent)	0.021	4.0	0.54	3.7	190	680	N/A	0.060
ALPE (Influent)	0.044	3.4	1.90	6.8	190	930	N/A	0.071
TEST REPORTING UNITS:	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**µg/L**	**mg/L**
TEST METHOD USED:	E200.7	E300.0	E365.1	E200.7	SM2340B	E160.1	E8082A	E200.7
ANALYZED BY (SELF/LAB):	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs

TSS - Total Suspended Solids
SC - Specific Conductance
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Test Method Used: E is EPA Method and SM is Standard methods for the examination of water and wastewater

Table A-6. Storm water quality data for March 3, 2006.

DESCRIBE DISCHARGE LOCATION	ANALYTICAL RESULTS For Second Storm Event			
	OTHER PARAMETERS			
	Gross alpha	Gross beta	Tritium	Plutonium 239+240
WPDC (ALP Effluent)	0.031±0.0270	0.091±0.0315	-1.47±1.92	<0.0037
GRNE (ALP Influent)	0.022±0.0226	0.104±0.0333	-1.36±1.92	N/A
ALPO (ALP Influent)	0.144±0.0888	0.285±0.703	1.57±2.00	N/A
ALPE (Influent)	0.286±0.1665	0.740±0.1739	1.27±1.96	N/A
TEST REPORTING UNITS:	**Bq/L**	**Bq/L**	**Bq/L**	**Bq/L**
TEST METHOD USED:	E900	E900	E906	AS:PUISO
ANALYZED BY (SELF/LAB):	Eberline	Eberline	Eberline	Eberline

Radioactivities are reported as the measured concentration and an uncertainty (s +/-2 counting error). If the concentration is less than or equal to the uncertainty, the result is considered to be a nondetection.

TSS - Total Suspended Solids

SC - Specific Conductance

O&G - Oil & Grease

TOC - Total Organic Carbon

Test Method Used: E is EPA Method and SM is Standard methods for the examination of water and wastewater

Table A-6. Storm water quality data for March 3, 2006.

DESCRIBE DISCHARGE LOCATION	DATE/TIME OF SAMPLE COLLECTION	TIME DISCHARGE STARTED	ANALYTICAL RESULTS For Second Storm Event						
			BASIC PARAMETERS					OTHER PARAMETERS	
			pH	TSS	SC	O&G	TOC	Aluminum	Arsenic
ASW (Arroyo Seco Effluent)	3/3/06 8:30 AM [X] PM [ ]	Ongoing AM [X] PM [ ]	8.34	4	860	<5	1.2	0.2	<0.002
ASS2 (Arroyo Seco Influent)	3/3/06 8:15 AM [X] PM [ ]	Ongoing AM [X] PM [ ]	7.36	25	38	<5	3.9	1.4	<0.002
TEST REPORTING UNITS:			**pH Units**	**mg/L**	**µmhos/cm**	**mg/L**	**mg/L**	**mg/L**	**mg/L**
TEST METHOD USED:			E150.1	E160.2	E120.1	E1664	E415.1	E200.7	E200.7
ANALYZED BY (SELF/LAB):			BC Labs	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs

TSS - Total Suspended Solids
SC - Specific Conductance
O&G - Oil & Grease
TOC - Total Organic Carbon
Test Method Used: E is EPA Method and SM is Standard methods for the examination of water and wastewater

Table A-6. Storm water quality data for March 3, 2006.

DESCRIBE DISCHARGE LOCATION	ANALYTICAL RESULTS For Second Storm Event							
	OTHER PARAMETERS							
	Barium	Beryllium	Boron	Bromacil	Cadmium	Calcium	Chloropropham	Chemical Oxygen Demand
ASW (Arroyo Seco Effluent)	0.10	<0.0002	0.70	<0.56	<0.0005	71	<1.1	25
ASS2 (Arroyo Seco Influent)	0.03	<0.0002	0.12	<0.50	<0.0005	4	<1.0	25
TEST REPORTING UNITS:	**mg/L**	**mg/L**	**mg/L**	**µg/L**	**mg/L**	**mg/L**	**µg/L**	**mg O/ L**
TEST METHOD USED:	E200.7	E200.7	E200.7	E525	E200.7	E200.7	E632	E410.4
ANALYZED BY (SELF/LAB):	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs

TSS - Total Suspended Solids
SC - Specific Conductance
O&G - Oil & Grease
TOC - Total Organic Carbon
Test Method Used: E is EPA Method and SM is Standard methods for the examination of water and wastewater

Table A-6. Storm water quality data for March 3, 2006.

DESCRIBE DISCHARGE LOCATION	ANALYTICAL RESULTS For Second Storm Event							
	OTHER PARAMETERS							
	Chromium	Copper	Diazinon	Diuron	Glyphosate	Hexavalent Chromium	Lead	Mercury
ASW (Arroyo Seco Effluent)	0.013	0.0038	<0.22	<1.1	<25	<0.002	<0.005	<0.0002
ASS2 (Arroyo Seco Influent)	0.005	0.005	<0.20	<1.0	<25	<0.002	<0.005	<0.0002
TEST REPORTING UNITS:	**mg/L**	**mg/L**	**µg/L**	**µg/L**	**µg/L**	**mg/L**	**mg/L**	**mg/L**
TEST METHOD USED:	E200.7	E200.7	E525	E632	E547	E200.7	E200.7	E200.7
ANALYZED BY (SELF/LAB):	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs

TSS - Total Suspended Solids
SC - Specific Conductance
O&G - Oil & Grease
TOC - Total Organic Carbon
Test Method Used: E is EPA Method and SM is Standard methods for the examination of water and wastewater

Table A-6. Storm water quality data for March 3, 2006.

DESCRIBE DISCHARGE LOCATION	ANALYTICAL RESULTS For Second Storm Event							
	OTHER PARAMETERS							
	Nickel	Nitrate (asNO3)	Ortho-Phosphate	Potassium	Total Hardness	Total Dissolved Solids	TOTAL PCB	Zinc
ASW (Arroyo Seco Effluent)	0.0025	31.0	0.19	2.1	300	530	<0.2	<0.020
ASS2 (Arroyo Seco Influent)	0.0064	1.1	0.64	1.3	15	45	N/A	0.091
TEST REPORTING UNITS:	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**µg/L**	**mg/L**
TEST METHOD USED:	E200.7	E300.0	E365.1	E200.7	SM2340B	E160.1	E8082A	E200.7
ANALYZED BY (SELF/LAB):	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs	BC Labs

TSS - Total Suspended Solids
SC - Specific Conductance
O&G - Oil & Grease
TOC - Total Organic Carbon
Test Method Used: E is EPA Method and SM is Standard methods for the examination of water and w

Table A-6. Storm water quality data for March 3, 2006.

DESCRIBE DISCHARGE LOCATION	ANALYTICAL RESULTS For Second Storm Event			
	OTHER PARAMETERS			
	Gross alpha	Gross beta	Tritium	Plutonium 239+240
ASW (Arroyo Seco Effluent)	-0.012±0.0592	0.127±0.0407	-0.69±1.92	<0.0037
ASS2 (Arroyo Seco Influent)	0.013±0.0178	0.067±0.0274	-3.38±1.96	N/A
TEST REPORTING UNITS:	**Bq/L**	**Bq/L**	**Bq/L**	**Bq/L**
TEST METHOD USED:	E900	E900	E906	AS:PUISO
ANALYZED BY (SELF/LAB):	Eberline	Eberline	Eberline	Eberline

Radioactivities are reported as the measured concentration and an uncertainty (s +/-2 counting error). If the concentration is less than or equal to the uncertainty, the result is considered to be a nondetection.

TSS - Total Suspended Solids

SC - Specific Conductance

O&G - Oil & Grease

TOC - Total Organic Carbon

Test Method Used: E is EPA Method and SM is Standard methods for the examination of water and wastewater

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